

SPECIAL SPECIFICATION

SECTION 06100S

ROUGH CARPENTRY

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SPECIAL SPECIFICATION

SECTION 06100S

ROUGH CARPENTRY

PART 1 - GENERAL

1.01 DESCRIPTION OF WORK

This Section includes the following :

- A. Framing with dimension lumber.
- B. Wood furring, grounds, nailers, and blocking.
- C. Sheathing.
- D. Subflooring.
- E. Underlayment.
- F. Rooftop equipment bases and support curbs.
- G. Fasteners and metal framing anchors.

1.02 ENVIRONMENTAL OBJECTIVES

- A. As described in section 01805S "Environmental Objectives", the owner has determined that this project must be rated by LEEDTM Version 2.0 green building rating system, which was issued in March 2000 by the U.S. Green Building Council, 1015 18th Street, NW, Suite 805, Washington, DC 20036. Phone: 202/ 82-USGBC (828-7422) Fax: 202/ 828-5110.
- B. The design has been pre-scored by the Design Team, using the LEEDTM rating system, in anticipation of submitting the buildings for certification as a "green" building. The Sustainable Design Report, a reference document to be used with the Contract Documents, represents the results of the sustainable design efforts for the MESA Complex and a pre-score of the LEEDTM rating. LEEDTM is a performance-based rating system, which gives points for those sustainable design elements incorporated into the final design.
- C. While these goals and implementation strategies are incorporated within the Contract Documents, suggestions and input from the contractor for implementing these goals are encouraged. A team approach is encouraged.
- D. Manufacturer/ Fabricator to supply documentation of level of compliance or non-compliance with the following requirements and objectives before consideration as an "Acceptable Manufacturer".

1. The Design Team has determined that the following be mandatory requirements:

- a. All wood-based materials are to be certified in accordance with the Forest Stewardship Council guidelines for wood building components. ForestWorld.com can help locate suppliers.
 - b. Comply with the requirements of section 01505S “Construction Waste Management”
- 2. The Design Team has determined that the following be mandatory requirements for products specified for interior air-conditioned spaces:
 - a. Composite wood or agrifiber products must contain no added urea-formaldehyde resins
 - b. Adhesives must meet or exceed the VOC limits of South Coast Air Quality Management District Rule #1168 by, AND all sealants used as a filler must meet or exceed Bay Area Air Resources Board Reg. 8, Rule 51
 - c. Paints and coatings must meet or exceed the VOC and chemical component limits of Green Seal requirements.
- 3. The Design Team has determined that the following be a highly desirable objective:
 - a. The product(s) supplied is manufactured/fabricated within a radius of 500 miles from the project site and/or the manufactured/fabricated product(s) are extracted, harvested, or recovered within 500 miles of the project site.
 - b. The product(s) supplied is to have a minimum weighted average of 20% post consumer recycled content material, OR, a minimum weighted average of 40% post-industrial recycled content material.
- E. Products that conform to the Environmental Objectives yet do not fully meet other requirements of this section may still be considered at the sole discretion of the Owner and Architect.

1.03 REFERENCES

- A. Forest Stewardship Council (FSC)
- B. Forest World.com
- C. American Forest and Paper Association (AFPA)
Manual for Wood Frame Construction
- D. American National Standards Institute (ANSI)
A208.1 Mat-Formed Manufactured Panels
- E. American Plywood Association (APA)
Form E30 Design/Construction Guide: Residential and Commercial
- F. American Society of Mechanical Engineers (ASME)

B18.2.1 Square and Hex Bolts and Screws - Inch Series

B18.6.1 Wood Screws (Inch Series)

G. American Society for Testing and Materials (ASTM)

A153 Specification for Zinc -Coating (Hot-Dip of Iron and Steel Hardware)

A307 Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength

A563 Specification for Carbon and Alloy Steel Nuts

A653 Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

D245 Practice for Establishing Structural Grades and Related Allowable Properties for Visually Graded Lumber

D2555 Test Method for Establishing Clear Wood Strength Values

H. American Wood Preservers Association (AWPA)

C2 Lumber, Pressure Treatment

C9 Plywood, Pressure Treatment

C20 Structural Lumber, Fire-Retardant Pressure Treatment

C27 Plywood, Fire-Retardant Pressure Treatment

M4 Standard for the Care of Preservative-Treated Wood Products

I. Federal Specification (FS)

FF-N-105B Nails, Brads, Staples and Spikes: Wire, Cut and Wrought

J. International Conference of Building Officials (ICBO)

International Building Code (IBC) Chapter 23 Wood

K. U.S. Department of Commerce, National Institute of Standards and Technology

PS 1 US Product Standard for Construction and Industrial Plywood

PS 2 Performance Standard for Wood-Based Structural-Use Panels

PS 20 American Softwood Lumber Standard (ASLS)

1.04 SUBMITTALS

- A. Environmental Objectives Documentation: signed by the manufactures/fabricators stating level of compliance for the requirements and objectives in Environmental Objectives in this section.

- B. General: Submit the following in accordance with the conditions of Contract and Division 1, Section “Descriptive Submittals.”
- C. Product Data: Submit manufacturer’s product data for each distinct product specified.
- D. Material certificates for dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use, and design values approved by American Lumber Standards Committee’s (ALSC) Board of Review.
- E. Wood treatment data as follows, including chemical treatment manufacturer’s warranty and instructions for handling, storing, installing, and finishing treated materials:
 - 1. For each type of preservative-treated wood product, include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.
 - 2. For waterborne-treated products, include statement that moisture content of treated materials was reduced to levels indicated before shipment to Project site.
 - 3. For fire-retardant-treated wood products, include certification by treating plant that treated materials comply with specified standard and other requirements as well as data relative to bending strength, stiffness, and fastener-holding capacities of treated materials.

1.05 QUALITY ASSURANCE

- A. Single-Source Responsibility for Fire-Retardant-Treated Wood: Obtain each type of fire-retardant-treated wood product from one source and by single producer.
- B. Forest Stewardship Council
- C. South Coast Air Quality Management District Rule 1168

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver wood products bundled or crated to provide adequate protection during transit and job storage, with required grade marks clearly identifiable. Inspect wood products for damage upon delivery. Remove and replace damaged materials.
- B. Keep materials under cover and dry. Protect from weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks, and under temporary coverings.

For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.
- C. Protect sheet materials during handling to prevent breaking of corners and damage to surfaces.

PART 2 - PRODUCTS

2.01 LUMBER, GENERAL

- A. Lumber Standards: Comply with PS 20, "American Softwood Lumber Standard," and with applicable grading rules of inspection agencies certified by ALSC's Board of Review. Lumber design values are to comply with ASTM D245 and ASTM D2555. Conform with Forest Stewardship Council Guidelines for certified wood building components.
- B. Inspection Agencies: Inspection agencies, and their grading rules include the following:
1. Northeastern Lumber Manufacturers Association (NELMA)
Standard Grading Rules
 2. National Lumber Grades Authority (NLGA)(Canadian)
Standard Grading Rules
 3. Redwood Inspection Service (RIS)
Standard Specifications for Grades of California Redwood Lumber
 4. Southern Pine Inspection Bureau (SPIB)
Standard Grading Rules for Southern Pine Lumber
 5. West Coast Lumber Inspection Bureau (WCLIB)
No. 17 Standard Grading Rules for West Coast Lumber
 6. Western Wood Products Association (WWPA)
Western Lumber Grading Rules
- C. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.
- For exposed lumber, furnish pieces with grade stamps applied to ends or back of each piece, or omit grade stamps and provide grade-compliance certificates issued by inspection agency.
- D. Where nominal sizes are indicated, provide actual sizes required by PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
1. Provide dressed lumber, surfaced four sides (S4S), unless otherwise indicated.
 2. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal (38 mm actual) thickness or less, unless otherwise indicated.

2.02 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. General: Where lumber or plywood is indicated as preservative treated or is specified to be treated, comply with applicable requirements of AWPAC2 (lumber) and AWPAC9 (plywood). Mark each treated item with Quality Mark Requirements of inspection agency approved by ALSC's Board of Review. Conform with Forest Stewardship Council Guidelines for certified wood building components. Do not use treatments with arsenic, chromium, pentachlorophenol, creosote, or other known carcinogens.

For exposed items indicated to receive stained finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

- B. Pressure treat aboveground items with waterborne preservatives to minimum retention of 0.25 lb/cu. ft. (4.0 kg/cu. m.). After treatment, kiln-dry lumber and plywood to maximum moisture content of 19 and 15 percent, respectively. Do not use treatments with arsenic, chromium, pentachlorophenol, creosote, or other known carcinogens. Treat indicated items and the following:
1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
 3. Wood framing members less than 18 inches (460 mm) above grade.
 4. Wood floor plates installed over concrete slabs directly in contact with earth.
- C. Pressure treat wood members in contact with ground or freshwater with waterborne preservatives to minimum retention of 0.40 lb/cu. ft. (6.4 kg/cu. m.).
- D. Complete fabrication of treated items before treatment, where possible. If cut after treatment, apply field treatment complying with AWPAC4 to cut surfaces. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

2.03 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated wood is indicated, comply with applicable requirements of AWPAC20 (lumber) and AWPAC27 (plywood). Identify fire-retardant-treated wood with appropriate classification marking of Underwriter Laboratory (UL), U.S. Testing, or Timber Products Inspection, Inc. Conform with Forest Stewardship Council Guidelines for certified wood building components.
- B. Interior Type A: For interior locations, use chemical formulation that produces treated lumber and plywood with the following properties under conditions present after installation:
1. Bending strength, stiffness, and fastener-holding capacities are not reduced below values published by manufacturer of chemical formulation under elevated temperature and humidity conditions simulating installed conditions when tested.
 2. No form of degradation occurs due to acid hydrolysis or other causes related to treatment.
 3. Contact with treated wood does not promote corrosion of metal fasteners.

- C. Exterior Type: Use for exterior locations, and where indicated.
- D. Inspect each piece of treated lumber or plywood after drying, and discard damaged or defective pieces.

2.04 DIMENSION LUMBER

- A. General: If not indicated on Contract documents, provide dimension lumber of any species and grades indicated for applicable use category listed in table below. Lumber shall comply with ALSC National Grading Rule (NGR) provisions of inspection agency applicable to species. Conform with Forest Stewardship Council Guidelines for certified wood building components.

PRODUCT (Nominal Dimension)	GRADE	USE
Structural Light Framing to 4 inches thick 2 to 4 inches wide	Select Structural No. 1 No. 2 No. 3	Structural applications where highest design values are needed in light framing sizes.
Light Framing to 4 inches thick 2 to 4 inches wide	Construction Standard Utility	Where high-strength values are not required, such as wall framing, plates, sills, cripples, and blocking.
Stud 2 to 4 inches thick 2 inches and wider	Stud	Optional all-purpose grade designed primarily for stud uses, including bearing walls.
Structural Joists and Planks 2 to 4 inches thick 5 inches and wider	Select Structural No. 1 No. 2 No. 3	Intended to fit engineering applications for lumber nominal 5 inches and wider, such as joists, rafters, headers, beams, trusses, and general framing.

B. Species and grades must meet or exceed the following values, unless indicated otherwise on Contract documents.

1. F_b (extreme fiber stress in bending): Minimum 850 psi (5.9 MPa).
2. E (modulus of elasticity): Minimum 1,300,000 psi (8950 MPa).

C. Exposed Framing: Refers to dimension lumber which is not concealed by other work, and is indicated to receive stained, painted, or natural finish.

Provide material hand-selected from lumber of species and grade indicated for type of use, for uniformity of appearance, and freedom from characteristics that would impair finish appearance.

2.05 MISCELLANEOUS LUMBER

- A. General: Provide lumber for support or attachment of other construction, including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members. Conform with Forest Stewardship Council Guildelines for certified wood building components.
- B. Fabricate miscellaneous lumber from dimension lumber of sizes indicated, and into shapes shown on Contract documents.
- C. Moisture Content: 19 percent maximum for lumber items not specified to receive wood preservative treatment.
- D. Grade and Species: For dimension lumber sizes, provide No. 3 or Standard grade lumber per ALSC's NGRs of any species. For board-size lumber, provide No. 3 Common or Standard grade per WWPA of any species.

2.06 WOOD-BASED STRUCTURAL-USE PANELS, GENERAL

- A. Structural-Use Panel Standards: Panel thickness, grade, veneer qualities and group number or span rating, shall be as shown on Drawings, and in accordance with recommendations of APA. Comply with PS 1 for plywood panels, and PS 2 for products not manufactured under PS 1 provisions. Conform with Forest Stewardship Council Guildelines for certified wood building components.
 - 1. Panels which have any edge or surface permanently exposed to weather shall be classed Exterior Grade.
 - 2. Panel thickness, grade, and group number or span rating shall be at least equal to that shown on Drawings.
 - 3. Application shall be in accordance with recommendations of APA.
 - 4. Binders with urea-formaldehyde is forbidden.
- B. Trademark: Factory-mark each structural-use panel with APA trademark evidencing compliance with grade requirements.

2.07 CONCEALED, PERFORMANCE-RATED STRUCTURAL-USE PANELS

- A. General: Where structural-use panels are indicated for concealed types of applications, provide APA performance rated panels complying with requirements indicated for grade designation, span rating, exposure durability classification, and edge detail (where applicable). Conform with Forest Stewardship Council Guildelines for certified wood building components.
 - 1. Provide panel clips for edge support as recommended by panel manufacturer, or where required by UBC.
 - 2. Provide panels of thickness meeting requirements specified, but not less than thickness indicated.
 - 3. Binders with urea-formaldehyde is forbidden.

- B. Combination Subfloor-Underlayment: APA- rated Sturd-I-Floor.
 - 1. Exposure Durability Classification: Exposure 1.
 - 2. Span Rating: As required to suit joist spacing indicated.
 - 3. Edge Detail: Tongue and groove.
 - 4. Surface Finish: Fully sanded face.
- C. Subflooring: APA-rated sheathing.
 - 1. Exposure Durability Classification: Exposure 1.
 - 2. Span Rating: As required to suit joist spacing indicated.
- D. Wall Sheathing: APA-rated sheathing.
 - 1. Exposure Durability Classification: Exposure 1. Where sheathing is exposed on any side, it shall be Exposure Durability Classification "Exterior."
 - 2. Span Rating: As required to suit stud spacing indicated.
- E. Roof Sheathing: APA-rated sheathing.
 - 1. Exposure Durability Classification: Exposure 1.
 - 2. Span Rating: As required to suit joist or truss spacing indicated.

2.08 STRUCTURAL-USE PANELS FOR BACKING

Plywood Backing Panels: For mounting electrical or telephone equipment, provide fire-retardant-treated plywood panels with grade C-D plugged Exposure 1, in thickness indicated on Contract documents or, if not otherwise indicated, not less than 15/32 inch (11.9 mm) thick. Conform with Forest Stewardship Council Guidelines for certified wood building components. No urea Formaldehyde.

2.09 STRUCTURAL-USE PANELS FOR UNDERLAYMENT

- A. General: Over smooth subfloors, provide underlayment not less than 1/4 inch (6.4 mm) thick. Over board or uneven subfloors, provide underlayment not less than 11/32 inch (8.7 mm) thick. Conform with Forest Stewardship Council Guidelines for certified wood building components. No urea Formaldehyde.
- B. Plywood Underlayment for Resilient Flooring: For underlayment under 19/32 inch (15.1 mm) thick, provide plywood panels with fully sanded face, APA Underlayment grade, Exposure 1.
- C. Structural-Use Panel Underlayment for Resilient Flooring: For underlayment 19/32 inch (15.1 mm) thick or more, provide fully sanded, veneer-faced, APA-rated, Sturd-I-Floor panels, Exposure 1.

- D. Plywood Underlayment for Ceramic Tile: Provide APA-rated, Underlayment grade, exterior plywood, 5/8 inch (15.9 mm) thick, for ceramic tile set in epoxy mortar.
- E. Plywood Underlayment for Carpet: For underlayment under 19/32 inch (15.1 mm) thick, provide plywood panels with fully sanded face, APA Underlayment grade, Exposure 1.
- F. Structural-Use Panel Underlayment for Carpet: For underlayment 19/32 inch (15.1 mm) thick or more, provide APA-rated Sturd-I-Floor panels with touch-sanded face, Exposure 1.

2.10 PARTICLEBOARD

- A. General: Comply with and factory mark each panel according to ANSI A208.1. Provide thickness indicated on Contract documents. Conform with Forest Stewardship Council Guildelines for certified wood building components.
- B. Particleboard Underlayment: Grade PBU.
- C. Particleboard Subflooring: Grade M-3-Exterior Glue.
- D. Particleboard Wall Sheathing: Grade M-1-Exterior Glue.

2.11 FASTENERS

- A. General: Provide fasteners of size and type indicated, that comply with requirements specified.

Where rough carpentry work is exposed to weather, in ground contact, or in areas of high relative humidity, provide fasteners with hot-dip, zinc-coating per ASTM A153

- B. Nails, Wire, Brads, and Staples: FS FF-N-105B.
- C. Wood Screws: ASME B18.6.1.
- D. Lag Bolts: ASME B18.2.1.
- E. Bolts: Steel bolts complying with ASTM A307, Grade A with ASTM A563 hex nuts and, where indicated, flat washers.

2.12 METAL FRAMING ANCHORS

- A. General: Provide galvanized steel framing anchors of structural capacity, type, and size indicated, with allowable design loads as published by manufacturer, that meet or exceed those indicated.
- B. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653, G60 coating designation; structural, commercial, or lock-forming quality, as standard with manufacturer for type of anchor indicated.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

- A. Discard units of material with defects that impair quality of rough carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.
- B. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.
- C. Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.
- D. Apply field treatment complying with AWP A M4 to cut surfaces of preservative-treated lumber and plywood.
- E. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with UBC Table 23-I-Q "Nailing Schedule".

3.02 WOOD GROUNDS, NAILERS, BLOCKING, AND SLEEPERS

- A. Install wood grounds, nailers, blocking, and sleepers where shown, and where required for screeding or attaching other work. Form to shapes shown and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.
- C. Install permanent grounds of dressed, preservative-treated, key-beveled lumber not less than 1-1/2 inches (38.1 mm) wide, and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.03 WOOD FURRING

- A. Install plumb and level with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Firestop furred spaces of walls at each floor level, and at ceiling with wood blocking or noncombustible materials, accurately fitted to close furred spaces.

3.04 WOOD FRAMING, GENERAL

- A. Framing Standard: Comply with AFPA's "Manual for Wood Frame Construction," unless otherwise indicated.
- B. Install framing members of size and at spacing indicated.
- C. Do not splice structural members between supports.
- D. Firestop concealed spaces of wood-framed walls and partitions at each floor level and at ceiling line of top story. Where firestopping is not inherent in framing system used,

provide closely fitted wood blocks of 2-inch nominal (38 mm actual) thickness lumber of same width as framing members.

- E. Arrange studs so that wide face of stud is perpendicular to direction of wall or partition and narrow face is parallel.
1. Provide single bottom plate and double top plates using members of 2-inch nominal (38 mm actual) thickness whose widths equal that of studs; except single top plate may be used for non-load-bearing partitions. Nail or anchor plates to supporting construction, unless otherwise indicated.
 2. For exterior walls, provide 2 by 6-inch nominal (38 by 140 mm actual) size wood studs spaced 24 inches (610 mm) o.c., except where otherwise indicated or required.
 3. For interior partitions and walls, provide 2 by 4-inch nominal (38 by 89 mm actual) size wood studs spaced 16 inches (406 mm) o.c., except where otherwise indicated or required.
- F. Construct corners and intersections with three (3) or more studs. Provide miscellaneous blocking and framing as shown, and as required to support facing materials, fixtures, specialty items, and trim.
- Provide continuous horizontal blocking at midheight of single-story partitions over 96 inches (2.4 m) high and multistory partitions, using members of 2-inch nominal (38 mm actual) thickness and of same width as wall or partitions.
- G. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Set headers on edge and support on jamb studs.
1. For non-load-bearing partitions, provide double-jamb studs with headers not less than 4-inch nominal (89 mm actual) depth for openings 36 inches (914 mm) and less in width, and not less than 6-inch nominal (140 mm actual) depth for wider openings.
 2. For load-bearing walls, provide double-jamb studs for openings 72 inches (1.8 m) and less in width, and triple-jamb studs for wider openings. Provide headers of depth shown as indicated on Contract documents.
- H. Provide bracing in exterior walls and at interior load-bearing walls (that are not more than 25 feet (7.6 m) from other parallel braced walls) at each end and at not more than 25 feet (7.6 m) apart, to comply with UBC Section 2326.11.3 "Bracing" and UBC Table 23-I-W "Braced Wall Panels" as required for Seismic Zone 2B.

3.05 FLOOR JOIST FRAMING

- A. General: Install floor joists with crown edge up and support ends of each member with not less than 1-1/2 inches (38.1 mm) of bearing on wood or metal, or 3 inches (76 mm) on masonry. Attach floor joists as follows:
1. Where supported on wood members, by toe nailing or by using metal framing anchors.
 2. Where framed into wood supporting members, by using wood ledgers as shown or, if not shown, by using metal joist hangers.

- B. Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceeds 48 inches (1.2 m).
- C. Do not notch in middle third of joists; limit notches to 1/6 depth of joist, 1/3 at ends. Do not bore holes larger than 1/3 depth of joist; do not locate closer than 2 inches (51 mm) from top or bottom.
- D. Provide solid blocking of 2-inch nominal (38 mm actual) thickness by depth of joist at ends of joists unless nailed to header or band.
- E. Lap members framing from opposite sides of beams, girders, or partitions not less than 4 inches (102 mm) or securely tie opposing members together. Provide solid blocking of 2-inch nominal (38 mm actual) thickness by depth of joist over supports.
- F. Under jamb studs at openings, provide solid blocking between joists.
- G. Under non-load-bearing partitions, provide double joists separated by solid blocking equal to depth of studs above.

Provide triple joists separated as above, under partitions receiving ceramic tile and similar heavy finishes or fixtures.

- H. Provide bridging of type indicated below, at intervals of 96 inches (2.4 m) o.c., between joists.
 1. Form diagonal wood bridging from bevel cut 1 by 3-inch nominal (19 by 64 mm actual) size lumber, double-crossed and nailed both ends to joists.
 2. Install steel bridging to comply with manufacturer's written instructions.

3.06 RAFTER AND CEILING JOIST FRAMING

- A. Ceiling Joists: Install ceiling joists with crown edge up and complying with requirements specified above for floor joists. Face nail to ends of parallel rafters.
- B. Rafters: Notch to fit exterior wall plates and toe nail or use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.
- C. Provide collar beams (ties) as shown or, if not shown, provide 1 by 6-inch nominal (19 by 140 mm actual) size boards between every third pair of rafters, but not more than 48 inches (1219 mm) o.c. Locate below ridge member, at third point of rafter span. Cut ends to fit roof slope and nail to rafters.
- D. Rafter Ties: Tie straps shall be provided from each roof framing member to exterior studs, posts or other supporting members below the roof. Opposing rafters at ridges shall be aligned and connected with straps.

3.07 STAIR FRAMING

- A Provide stair framing members of size, space, and configuration indicated or, if not otherwise indicated, to comply with the following requirements:
1. Stringer Size: 2 by 12-inch nominal (38 by 286 mm actual) size minimum.
 2. Notching: Notch stringers to receive treads, risers, and supports; leave at least 3-1/2 inches (89 mm) of effective depth.
 3. Stringer Spacing: At least three (3) stringers for each 36-inch (914 mm) clear width of stair.
- B Provide stair framing that does not exceed the following variations between treads and risers within each flight:
1. Adjacent Treads and Risers: 3/16 inch (4.76 mm).
 2. Between Largest and Smallest Treads and Risers: 3/8 inch (9.53 mm).

3.08 INSTALLATION OF STRUCTURAL-USE PANELS

- A General: Comply with applicable recommendations contained in APA Form No. E30, for types of structural-use panels and applications indicated.
- B Fastening Methods: Fasten panels as indicated below:
1. Combination Subflooring-Underlayment: Glue subflooring and underlayment to floor joists, and screw to joists. Space panels 1/8 inch (3.18 mm) at edges and ends.
 2. Subflooring: Glue subflooring to floor joists, and screw to joists. Space panels 1/8 inch (3.18 mm) at edge and ends.
 3. Sheathing: Nail to framing. Space panels 1/8 inch (3.18 mm) at edges and ends.
 4. Underlayment: Nail to subflooring. Space panels 1/32 inch (0.8 mm) at edges and ends.
 5. Plywood Backing Panels: Nail or screw to supports.

3.09 PARTICLEBOARD UNDERLAYMENT

Install to comply with the recommendations of the National Particleboard Association (NPA) for type of subfloor indicated.

- A. Fill and sand gouges, gaps, and chipped edges. Sand uneven joints flush.
- B. Glue and nail underlayment to subflooring throughout.

END OF SECTION